Date Completed: _____
Mentor Initials: _____

A mentor can change everything.

ESM PREP

## Exponents and Radicals (Intermediate)

**1.** Which of the following expressions is equivalent to $\frac{a^7b^6cd^3}{a^5b^7c^4d^2}$ ?

A) $\frac{a^2bcd}{b^6c^4d^2}$

B) $\frac{a^2d}{bc^3}$

C) $a^{\frac{7}{5}}b^{\frac{6}{7}}c^{\frac{1}{4}}d^{\frac{3}{2}}$

D) $a^{12}b^{13}c^5d^5$

**2.** Which of the following is equivalent to $\left(\frac{1}{x^b}\right) + x^{-b}$ ?

A) $1 - x^b$

B) $\left(\frac{2}{x^b}\right)$

C) $1^x + \frac{1}{x^b}$

D) $2x^b$

**3.** For all nonzero $a, b,$ and $c,$ which of the following is equal to $(\frac{3a^{-2}b^3c^0}{9a^3b^{-4}c})^{-3}$ ?

A) $\frac{27c^3}{a^{15}b^{21}}$

B) $\frac{27a^{15}}{b^{21}c^3}$

C) $\frac{27a^{15}c^3}{b^{21}}$

D) $\frac{a^{15}b^{21}}{27c^3}$

**4.** Which of the following is equivalent to $(x + 3)^0$ whenever $x \neq -3$ ?

A) x + 3

B) 0

C) 1

D) 2

**5.** Which of the following is equivalent to $\sqrt[4]{x^2 + 6x + 9}$ ?

A) $(x + 3)^4$

B) $(x + 3)^2$

C) $(x + 3)$

D) $(x + 3)^{\frac{1}{2}}$

**6** Which of the following is an equivalent form of $\sqrt[3]{h^2 g^{9b}}$, where $g > 0$ and $h > 0$ ?

A) $h^{-1} g^{\frac{1}{3b}}$

B) $h^{\frac{3}{2}} g^{\frac{1}{3b}}$

C) $h^{-1} g^{3b}$

D) $h^{\frac{2}{3}} g^{3b}$

**7.** Which of the following expressions is equivalent to $(y + 4)^{-50}$ ?

A) $-50y - 200$

B) $\frac{1}{y^{50}} + \frac{1}{4^{50}}$

C) $-y^{50} - 4^{50}$

D) $\frac{1}{(y+4)^{50}}$

**8.** If $d, e,$ and $f$ are positive integers such that $d^e = x$ and $f^e = y$, then $xy =$ ?

A) $(df)^e$

B) $(df)^{2e}$

C) $df^e$

D) $df^{2e}$

**9.** Which of the following is equivalent to the expression $(16m^2)^{\frac{1}{2}} + (8m^6)^{\frac{1}{3}} - 80^{\frac{1}{2}}$?

A) $16m + \frac{8}{3}m^2 - 40$

B) $16m + 2m^2 - 4\sqrt{5}$

C) $4m + 2m^2 - 4\sqrt{5}$

D) $4m + \frac{8}{3}m^2 - 40$

**10.** Which of the following could be the value of $\sqrt{y^2}$ for some integer $y$ ?

A) $-4$

B) $-2$

C) $\frac{1}{3}$

D) $4$

**11.** Which of the following expressions is equivalent to $(27y^8x^7)^{\frac{1}{3}}$, where $x \geq 0$ and $y \geq 0$ ?

A) $3y^2x^{\frac{7}{3}}$

B) $3y^{\frac{8}{3}}x^{\frac{7}{3}}$

C) $9y^2x^{\frac{7}{3}}$

D) $9y^{\frac{8}{3}}x^{\frac{7}{3}}$

**12.** If $a > 0$ and $b > 0$, which of the following expressions is equivalent to $\frac{28a^2b^4}{7ab^2}$ ?

A) $4ab^2$

B) $4a^3b^6$

C) $4a^3b^8$

D) $21ab^2$

**13.** Which of the following is equivalent to the expression $9^{-\frac{1}{2}}\left((a^2)(a^4) - \frac{a^2b^{14}}{ab^8} + c^{\frac{2}{3}}\right)$ ?

A) $\frac{a^6 - ab^6 + \sqrt[3]{c^2}}{3}$

B) $\frac{a^6 - ab^6 + \sqrt{c^3}}{3}$

C) $\frac{a^8 - ab^6 + \sqrt[3]{c^2}}{3}$

D) $3a^6 - a^2b^6 + \frac{2}{3}c$

**14.** What real value of $m$ satisfies the equation $9^m = \frac{1}{81^{m+1}}$?

A) $-2$

B) $-\frac{2}{3}$

C) $-\frac{1}{6}$

D) $\frac{1}{6}$

**15.** Given $9^{\frac{3x+1}{x}} = 1$, $x = ?$

A) $-\frac{1}{2}$

B) $-\frac{1}{3}$

C) $\frac{1}{2}$

D) $\frac{1}{3}$